the forecasts of the Weather Bureau, is that I have been dealing with conditions that actually exist aloft but not at the earth's surface. The only certainty remaining in my case is that due to the possible failure of those conditions to descend to the earth. I believe that predictions founded on observations taken below the 1,000-foot level will be found to cover a shorter period of time, say twelve hours, than those based on data obtained by means of kites at a height of 10,000 feet, since the Blue Hill observations show that high-level conditions are slower in reaching the earth. The remaining question is as to whether or not changes of wind and the disturbance caused by the sudden formation of anticyclones and cyclones may cause the conditions at the 10,000-foot level to change without affecting the surface air. Owing to my many experiments relating to other questions than weather forecasts I have not had time to properly search out this element of uncertainty, if it exists, in the Blue Hill observations and at Bayonne.

The astonishing fact is beginning to appear that perhaps the most important changes take place within less than 1,000 feet of the earth. In a paper by Mr. A. Lawrence Rotch, Director of Blue Hill Observatory (see Quarterly Journal of the Royal Meteorological Society, Vol. XXIV, No. 108, October, 1898, p. 256) it is said that before a warm wave there is—

During the day a decrease of temperature at the adiabatic rate from the ground up to more than 1,000 feet, then a sudden rise of temperature, amounting perhaps to 15°, followed by a slow fall.

But at the approach of a cold wave he says there is—

A rapid fall of temperature which exceeds the adiabatic rate up to above 1,000 feet, and above that it falls at the adiabatic rate up to 3,000 feet or higher.

Again, he says, p. 257:

After the cold wave has passed and with the coming of a southeast storm the temperature rises rapidly up to a height of 1,000 or 2,000 feet and then slowly falls.

These observations made by Mr. Rotch exactly agree with mine, but I must add the following facts observed recently at Bayonne:

I have found it convenient, instead of using the adiabatic rate of 1° for each 180 feet of ascent to use 1° for every 250 feet of ascent, for the rate of cooling is usually slower for the first thousand feet because of the proximity of the earth, especially in summer. I find that abnormal warmth, at the height of a few hundred feet is apt to precede a cold wave, coming in on the heels of a storm. On one occasion in the autumn the air was 4° warmer than the surface at the height of 300 feet. The steel index on the right-hand side of the (Six's) thermometer could not have been jolted upward. The result was a cold wave the following morning. Meantime, I did not dare to predict. On February 8, 1899, at 8 p. m., when I encountered somewhat similar abnormalities, temperature at the earth rising and falling, but with a rapid fall as the kite-sustained thermometer went upward, I predicted a cold wave for the 9th; the prediction was published in the New York morning Sun of February 9; on the previous afternoon the Weather Bureau had forecasted the same conditions: my local observation was, like all my observations, intended as auxiliary to those of the Weather Bureau. The cold wave lasted a week and broke the record at New York.

Great care is called for in making kite predictions of warm waves founded on warmer air aloft, in case a storm is just passing off; because then the intermingling air currents indicate a cold instead of a warm wave. I think it is necessary in making predictions founded on warmer air aloft, to send the thermometer as far as possible beyond the 1,000-foot level.

At the beginning of a cold wave on February 4, 1891, my kite thermometer recorded a fall of 5° for a height of 600 feet. In the above-mentioned article in the American Meteorological Journal for July, 1891, I said, in discussing this fact:

It was an instance illustrating the fact that a cold wave could be detected promptly through either kite or balloon observations.

While I am preceded in kite thermometer experiments by Wilson and Melville, 1749, in Scotland, and by Birt in Englang in 1847, yet I seem to have been the first to declare in public that the kite could be used for weather prediction and the first to make a positive kite prediction in the public press. I shall continue to experiment regarding some untried problems relative to temperature, snow, hail, sleet, rain, and thunder showers, but in the main I shall turn to other questions while my thermometer ascensions are and will be far surpassed by the wonderful achievements at Blue Hill, Washington, and elsewhere.

OBSERVATIONS AT RIVAS, NICARAGUA.

The records contributed for many years by Dr. Earl Flint, at Rivas, Nicaragua, include barometric readings. His present station is at 11° 26′ N., 85° 47′ W. The observations at 7:17 a. m., local time are simultaneous with Greenwich 1 p. m. The altitude of his barometer is 36 meters above sea level, but until the barometer has been compared with a standard it seems hardly necessary to publish the daily readings. The wind force is recorded on the Beaufort scale, 0–12. When cloudiness is less than $\frac{1}{10}$, the letter "F," or "Few," is recorded.

This station is situated on the western shore of Lake Nicaragua, not far from the eastern end of the western division of the Nicaragua Canal. The volcano Ometepe, on an island in Lake Nicaragua, is about 10 miles northeast of the station. Mr. Flint's records occasionally mention the presence of clouds in the early morning on the summit of this mountain.

Observations at Rivas, Nicaragua, February, 1899.

OBSERVATIONS AT 7:17 A. M. LOCAL (8 A. M. EASTERN STANDARD) TIME.

Date.	Temperature.		Wind.		Upper clouds.			Lower clouds.			Daily rainfall.
	Air.	Dew-point.	Direction.	Force.	Kind.	Amount.	Direction from.	Kind.	Amount.	Direction from.	
	°	°									
1	76	70	ne.	1				k.	5	ne.	0.00
2	75	71	e.	2–3				k.	1	e.	0.02
3	75.5	70	ne.	2				k.*	Few	ne.	0.00
4	76	70	ne.	2				k.	Few	ne.	0.00
5	76	70	ne.	1				k.	3	ne.	0.00
6	75.5	71	ne.	1				k.	1	ne.	0.00
7	74.5	71	se.	0				k.	5	se.	0.00
8	72	69	sw.	0				ak. k.	2 2	nw. s.w.	T.
9	74	70	se.	2	cs.	1		ks.	8	se.	0.52
10	74	71	se.	1				k.*			0.00
11	76	72	se.	1				ks., ak.	2	se.	0.00
12	77	73	se.	1				k.	10	se.	0.33
13	76	70	se.	2–3	cs., ck.	9	se., s.	k.		se.	0.00
14	69	62	se.	3–4				ak.	3	se.	0.00
15	73	67	e.	3				f. k.	2	e.	0.00
16	74	72	se.	0	cs.	5	se.	k.			0.00
17	76	73	se.	1				k.	10	se.	0.69
18	75	72	ne.	1	ck.	Few	nw.	k.	1	ne.	0.02
19	76	71	ne.	2				k.	1	ne.	0.12
20	75	71	ne.	1	ck.	5	se.	k.	1	ne.	0.00
21	77	73	se.	1				k	Few	se.	T.
22	75.5	71	ne.	1				k.*	Few	ne.	0.00
23	76.5	72	ne.	1				k.	1	ne.	0.00
24	77	70	ne.	1				k.	9	ne.	0.00
25	75.5	71	ne.	2	ck.	1	se.	k.	5	se.	0.00
26	76	71	ne.	1				k.	Few	ne.	0.00
27	76.5	72	ne.	1	cs.		sw.	k.	10	ne.	0.00
28	74	68	ne.	2				k.	9	ne.	T.
Sums											1.90
Means	75.5										

*On Ometepe.

OBSERVATIONS AT 8 P. M. EASTERN STANDARD TIME, (7:17 P. M. LOCAL.)

Date.	Temperature.		Wind.		Upper clouds.			Lower clouds.		
	Air.	Dew-point.	Direction.	Force.	Kind	Amount.	Direction from.	Kind.	Amount.	Direction from.
	°	°								
1	78	72	ne.	2		0				
2	79	69	ne.	2-3		0				
3	79.5	72	ne.	1		0				
4	79	73	ne.	2		0				
5	79	73	ne.	1				ks.	Few	ne.
6	79	72	se.	0				ks.	10	?
7	79	74	w.	0.5		0			0	
8	78.5	74	se.	0		0			0	
9	77	71	ne.	2	cs.	10	ne.			
10	79	73	se.	0.5		0		k.*		
11	79	73	se.	1		0		ak.	Few	
12	79	73	se.	1				k.	10	se.
13	74	65	e.	3-4	c.	1	e.			
14	75	68	se.	2				ak.	4	se.
15	77	72	se.	2				d.k.	5	se.
16	78	72	se.	1				f.k.	1	se.
17	76	73	se.	1				ak.	10	se.
18	77.5	73	e.	2	ck.	8	e.			
19	77	73	ne.	1				ak.	9	ne.
20	79	73	ne.	1				ak.	10	ne.
21	79	73	se.	2	ck.	5	se.			
22	80.5	75	se.	1				k.	3	se.
23	81	74	ne.	2				a.k.,k.	8	ne.
24	78	72	se.	2				k.	10	se.
25	80	73	se.	0	c.	Few	s.			
26	79	75	se.	1				f.k.	5	se.
27	79	73	ne.	3	ck.	Few	se.			
28	79	75	ne.	2				k.	10	ne.
Means	78.2									

*Cumuli on Ometepe.

The rainfall occurred as follows: 2d, sprinkle at 3 a. m.; 9th, rain at 3:15 and 9 a. m.; 12th, thunderstorm from 7 to 8 p. m.; 17th, sprinkle, 0.02 inch at 1 a. m., frequent showers reported at Tortuga, about 50 miles southeast of Rivas on the southwest shore of Lake Nicaragua; 18th, sprinkle at 5:45 p. m.; 19th, sprinkle, 0.10 p. m.; 21st, sprinkle at 1 p. m.

The barometric range for the month was 0.16. The lowest occurred on the 21st and the highest on the 14th. Cool waves occurred on the 9th and 14th. On the 8th calm and smoky with a light air from the southwest; a shower occurred 5 miles to the northward, and a sprinkle at Rivas; 9th, wind backed to northeast at 10 a. m.; 15th, phenomenal clouds from the south and southwest.

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Mariano Bárcena, Director, and Señor José Zendejas, vice-director, of the Central Meteorologico-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the *Boletin Mensual;* an abstract translated into English measures is here given in continuation of the similar tables published in the MONTHLY WEATHER REVIEW since 1896. The barometric means have not been reduced to standard gravity, but this correction will be given at some future date when the pressures are published on our Chart IV.

Mexican data for March, 1899.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Colima	1,600	28.28	91.8	53.8	74.7	59		sw.	sw.
Durango (Seminario)	6,243	24.02	93.2	34.2	62.2	24		sw.	e.
Guanajuato	6,640	23.69	87.3	42.3	65.3	38		sw.	sw,w,nw
Leon (Guanajuato)	5,934	24.28	86.5	33.8	64.2	27		s.	sw.
Mexico (Obs. Cent.)	7,472	23.04	80.4	38.3	61.9	44	0.06	nw.	sw.
Morelia (Seminario)	6,401	23.97	84.4	43.5	65.7	46	T	sw.	w.
Oaxaca	5,164	25.06	92.1	38.1	70.7	55	0.60	s.	sw.
Puebla (Col. Cat.)	7,112	23.34	83.5	30.6	64.8	59		ene.	ssw.
Tuxpan (Vera Cruz)	19	29.90	100.4	57.2	76.3	76	T.	e.	n.
Siloa	6,063	24.26	82.9	41.7	66.7	39		wnw.	w.
Zapotlan (Seminario)	5,078	25.10	88.7	44.6	69.4	65		sse.	wsw.

WEATHER FORECASTING IN HONGKONG.

By W. DOBERCK, Director of the Hongkong Observatory (dated February 17, 1899).

In the law of storms in the eastern seas it is explained that all the phenomena connected with typhoons are natural consequences of the barometric gradients, and that the steepness of these cause enormous rainfalls, and that these tend to increase the gradients till the rainfall ceases for lack of water vapor when the center of the typhoon enters dry land. These phenomena are not qualitatively different from those experienced in colder climates. Although the climates feel so extremely different, there is scarcely sufficient difference in temperature to cause any substantial difference in the laws governing the weather. This is most apparent when the extreme differences in temperature are expressed on the absolute scale beginning with absolute zero.

In the northeast monsoon the wind blows practically always from the northeast, east, or east-southeast, as pressure is relatively lowest to the south. In midwinter the lowest pressure lies to the south of the equator, and in spring and autumn it lies to the north of the equator, a trough-shaped depression lying between the northeast and southwest winds. On the contrary, in the southwest monsoon there is no southwest wind in Hongkong unless there happens to be a depression to the north of the observer. A permanent depression inland in northern China or Siberia does not exist.

During the northeast monsoon, when the center of an anticyclone moving along eastward between preceding and following cyclones, passes comparatively close to Hongkong the weather clears there. The latitude of the centers of the anticyclones is generally about 35°, and perhaps never as low as 27°. The time when the northeast wind is strongest is not when the center is just north of or nearest to Hongkong, but occurs usually when the center is past, because the high pressure spreads to the south and southeast, so that pressure continues rising along the south coast of China after the center is past.

When during the northeast monsoon a low pressure advances across north China and Korea it seldom causes southwest wind in Hongkong, but only calms or very light winds. At the same time southwest winds are frequently reported from Saigon and the southern Phillipines, apparently against the gradient. This is caused by local shallow low pressures over the land, which becomes intensely heated, owing to the absence of the usual northeast monsoon and owing to the clear sky and hot sunshine. Such southwest breezes must have a diurnal period like land and sea breezes, and they do not blow at sea except very near land.

Northers in Hongkong are just like northers in Texas. They occur with falling temperature after very hot days in winter and spring. In case of high barometric areas over north China, Korea, and Japan sometimes a V-shaped depression with isobars open toward the south is formed near Formosa. Such a depression develops into a cyclone moving toward Japan.

While the weather in Hongkong in winter depends upon the latitude in which the cyclones and anticyclones are crossing to the northward, it depends in summer upon the latitude of the troughs.

Mr. A. G. Figg, who officiates as weather forecaster in Hongkong, states that there appears to be a general agreement in recent years between droughts in India and droughts in Hongkong.

Before a period of foggy weather sets in we note an upper current from south or southwest above the east wind. Then fog occurs along the coast, which is cooler than the sea, with light (usually east) wind. With west wind the coast is not so cool, and therefore fog is not so likely to occur as with east wind or calm.